No. 871,539. PATENTED NOV. 19, 1907.

C. E. VAN AUKEN.

MULTIPLE PISTON INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JAN. 7, 1905.

2 SHEETS—SHEET 1.

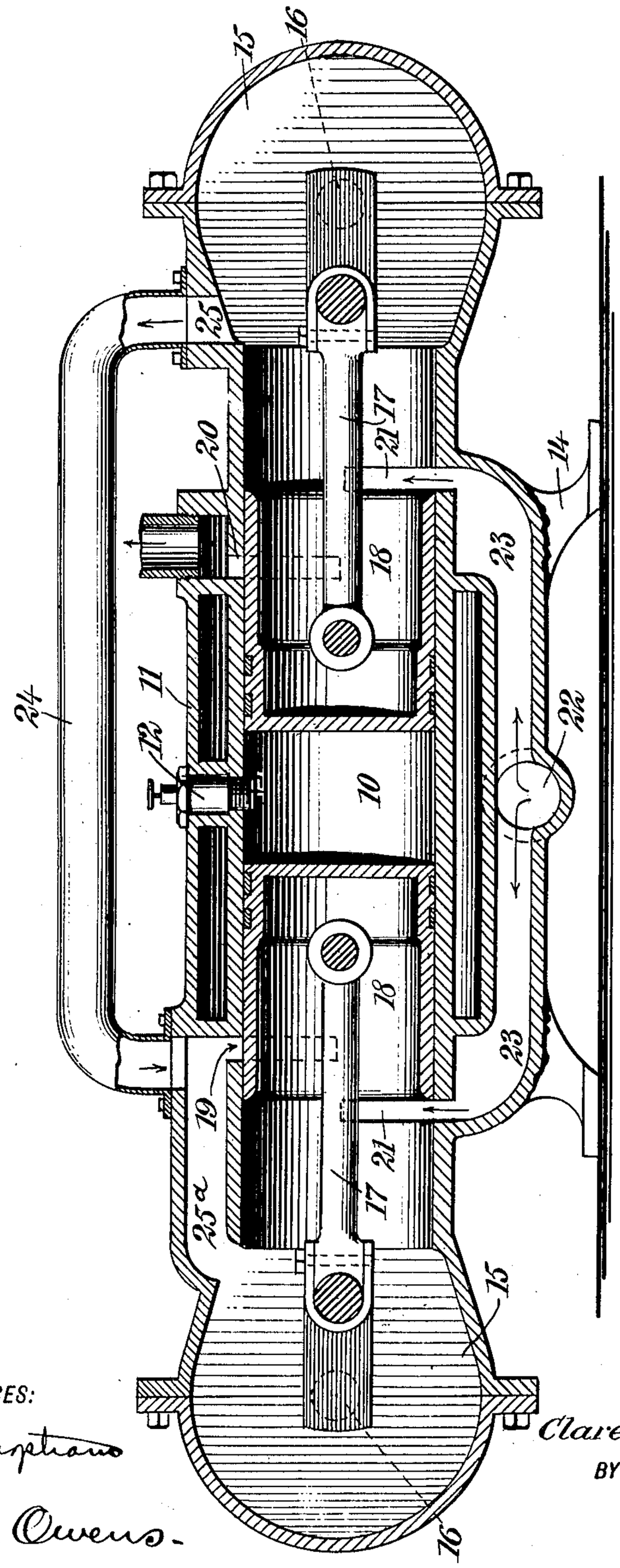

FIG. 1.

WITNESSES:

John A. Berglund

Isaac B. Owens.

INVENTOR

Clarence E. Van Auken

BY

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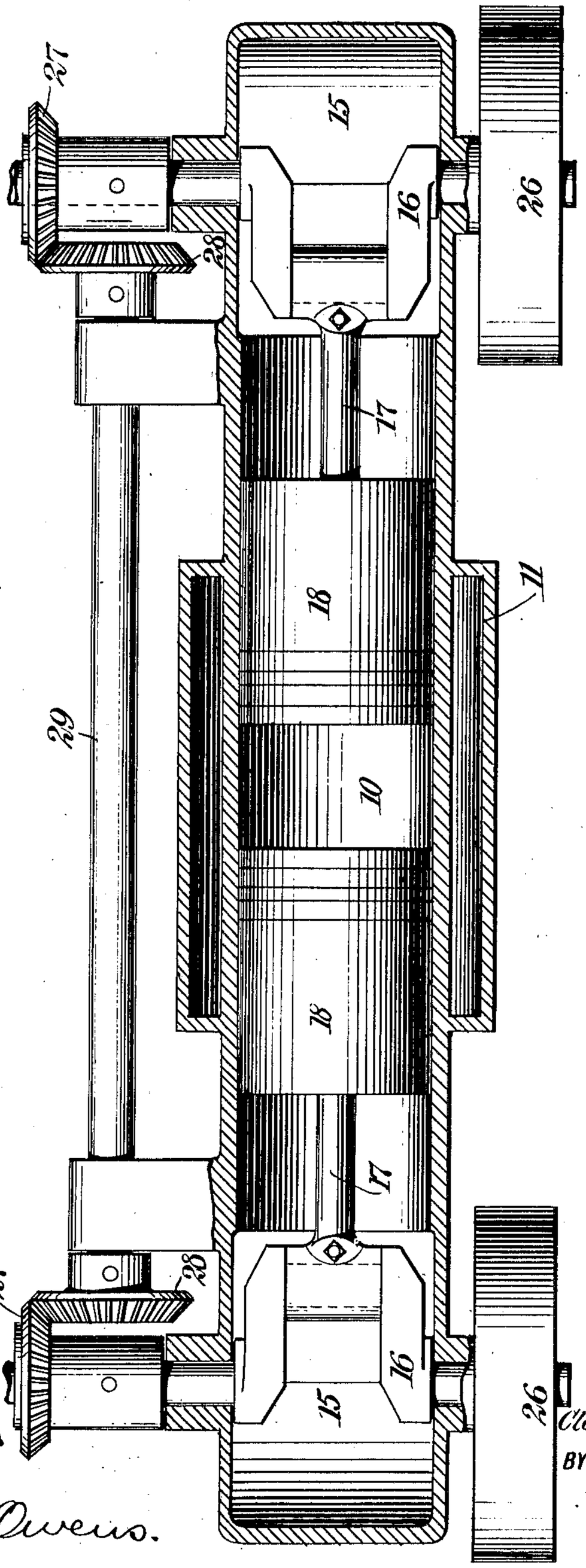

FIG. 2.

WITNESSES:

John A. Bergstrom

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UNITED STATES PATENT OFFICE.

CLARENCE E. VAN AUKEN, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO VAN AUKEN MOTOR AND MACHINE WORKS, A CORPORATION OF NEW YORK.

MULTIPLE-PISTON INTERNAL-COMBUSTION ENGINE.

No. 871,539. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed January 7, 1905. Serial No. 240,005.

To all whom it may concern:

Be it known that I, CLARENCE E. VAN AUKEN, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented a new and Improved Multiple-Piston Internal-Combustion Engine, of which the following is a full, clear, and exact description.

This invention relates to an internal combustion engine of that general type in which a single cylinder is provided with two pistons arranged to be forced apart by the explosion.

A special object of my invention is to improve the port arrangement so that the engine is rendered valveless and the charge may be admitted simultaneously to the two crank cases respectively at the ends of the cylinder, in which cases the charge is compressed and thence transferred through a small inlet port to the cylinder. In attaining this end I provide each crank case with an admission port uncovered by the pistons when at the limit of their inward strokes and both of these admission ports have communication with the source of fuel mixture, thus permitting me to instantly charge both crank cases and, notwithstanding the high speed of the engine, insuring sufficient mixture to amply fill the working chamber. By thus filling both crank cases directly I can run the engine at high speed without danger of incomplete charging. From one crank case a supply passage leads to a cylinder inlet port which is uncovered by one of the pistons at its out stroke, and to said supply passage a transfer passage from the other crank case leads. It follows that the arrangements for controlling the flow of mixture to the working chamber are such as insure rapid movements of full charges and thus allow of running the engine at its highest capacity.

The invention involves various other features of major or minor importance, all of which will be fully set forth hereinafter and pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures, in which

Figure 1 is a vertical longitudinal section of the engine; and Fig. 2 is a horizontal section thereof.

The form of the engine which I have here chosen to illustrate embodies a single cylinder 10 provided with a water jacket 11 and an igniting device 12 of any desired form, the igniting device lying approximately midway the length of the cylinder as shown. The engine may be mounted on a base 14, the construction of which is in no way essential. At each end of the cylinder, a closed crank case 15 is arranged. These crank cases communicate respectively with the cylinder ends and have a crank shaft 16 revolubly mounted therein, as shown. Connected with the cranks of said shaft are the rods 17, which are in turn joined respectively to trunk pistons 18, operating in the cylinder and arranged to move simultaneously toward or from each other, as the disposition of the crank shafts in the two views shows.

19 indicates the inlet port of the engine, which passes into the cylinder 10 near one end thereof, and 20 indicates the exhaust port which passes from the other end portion, as shown. The ports 19 and 20 in the end parts of the cylinder 10 are so positioned that they will be uncovered by their respective pistons when the pistons reach the ends of their outward strokes. Each end portion of the cylinder is also formed with a port 21 and these ports are positioned so that they will be uncovered by their respective pistons when the pistons reach the end of their inward or compression strokes.

22 indicated the source of combustible mixture which may be of any desired sort. This mixture source 22 opens into the middle of a duct 23, which passes outside of the jacket 11 of the cylinder 10 and communicates at its ends respectively with the ports 21. The right-hand crank case 15 has a port 25 formed therein and with this port a conduit 24 communicates. This conduit 24 extends toward the left-hand end of the engine and at its inner end communicates with a port 25ª. This port 25ª leads from the left-hand crank case 15 outside of the adjacent end of the cylinder to the port 19. It will be observed, therefore, that the port 25 and conduit 24 furnish a means placing the right crank case in communication with the port 19, and that the port 25ª furnishes a means placing the left-hand crank case in communication with said port.

Each crank shaft 16 is provided with a balance wheel 26 and also carries a miter gear

27. These gears are meshed with corresponding gears 28 attached to a shaft 29 suitably sustained on the frame of the engine.

In the operation of the engine, assuming that a charge of fuel and air has been compressed between the piston heads in the center of the cylinder (referring to Fig. 1), upon igniting this charge combustion and expansion will take place and the pistons will be driven outward. The exhaust port 20 is first uncovered and the gases within the cylinder fall to atmospheric pressure. Subsequently, the inlet port 19 is uncovered and the fuel mixture previously compressed in the crank case passes through the port in the cylinder and moves through the same in a compact column toward the exhaust port 20, pushing out through said port all of the burned gases lying in the cylinder. Finally, the pistons begin their return movement, and the inlet and exhaust ports are closed and the compressive period begins. When the pistons reach the limit of their inward movement the ports 21 are uncovered, and owing to the rarefaction within the crank cases due to the inward or compressive movement of the pistons, the instant the ports 21 are uncovered a charge of mixture is drawn into the crank cases through the ducts 23, and this mixture being entrapped upon the outward movement of the pistons is next compressed thereby. When the pistons reach the limit of their outward movement the ports 19 and 20 are again uncovered and then the mixture compressed in the two crank cases, ports 25 and 25[a] and duct 24 enters the cylinder through the port 19, taking its place in the cylinder to be compressed by the returning pistons as has been explained hereinbefore. The gearing connecting the two crank shafts in the preferred embodiment of my invention, serves to retain said shafts and their connecting pistons in the proper relation to each other.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An internal combustion engine having a double cylinder, closed chambers communicating, respectively, with each end thereof, opposed pistons operating in the end portions of the cylinder, means connecting the pistons to permit them to move in unison, the cylinder having an inlet port, an exhaust port in each of the opposite end portions, and additional ports adapted to communicate respectively with the said chambers, the inlet and exhaust ports being uncovered by the pistons when in their outer positions and the said additional ports being uncovered by the pistons when in their inward positions, means placing said additional ports in communication with the source of combustible mixture, and walls forming passages from the said closed chambers to the inlet port.

2. An internal combustion engine having a double cylinder, closed chambers communicating, respectively, with each end thereof, opposed pistons operating in the end portions of the cylinder, means connecting the pistons to permit them to move in unison as they reciprocate in opposite directions, the cylinder having an inlet port and an exhaust port, one being located adjacent each end portion, and having additional ports adapted to communicate, respectively, with the said chambers, the inlet and exhaust ports being uncovered by the pistons when in their outer positions and the said additional ports being uncovered by the pistons when in their inner positions, means placing said additional ports in communication with the source of combustible mixture, walls forming a passage from one of said closed chambers around the adjacent cylinder end to the inlet port, and a transfer conduit extending from said passage at a point adjacent to the inlet port to the opposite chamber.

3. An internal combustion engine having a double cylinder, closed chambers communicating, respectively, with each end thereof, opposed pistons operating in the end portions of the cylinder, means connecting the pistons to maintain them in unison as they reciprocate, the cylinder having an inlet port and an exhaust port in its respective end portions and having additional ports adapted to communicate, respectively, with the said chambers, the inlet port and the exhaust port being uncovered by the pistons when in their outer positions and the said additional ports being uncovered by the pistons when in their inner positions, a conduit leading from each of said closed chambers around the adjacent cylinder ends to the inlet port, and means placing the additional ports in communication with the source of combustible mixture consisting in a conduit passing between said ports and having an inlet opening intermediate its ends whereby equally to supply the said chambers.

4. An internal combustion engine having a double cylinder provided with an inlet port, opposed pistons therein, closed compressor chambers respectively at the ends of the cylinders, the engine having an inlet port for each compressor chamber uncovered by the pistons at the end of their inward strokes, means placing said inlet ports in equal communication with the source of fuel mixture whereby to secure maximum fuel charges in said chambers, and means placing both compressor chambers in communication with the inlet port of the working cylinder.

5. An internal combustion engine having

a double cylinder provided with an inlet port adjacent one end thereof, an exhaust port adjacent the opposite end thereof, pistons located therein and connected for operation in unison in opposite directions, closed compressor chambers respectively at the ends of the cylinder, said engine having inlet ports for each compressor chamber uncovered by the pistons at the end of their inward strokes, means for delivering a fuel mixture to each of said chambers in equal proportions, and means placing both compressor chambers in communication with the inlet port of the working cylinder.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CLARENCE E. VAN AUKEN.

Witnesses:
WM. W. SCRUGHAM,
GABRIEL REEVE.